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Confidential

**WATER FIRE EXTINGUISHING.
SPRINKLING, FLOODING AND
WATER PROTECTION SYSTEMS
Description and Service
Instructions**

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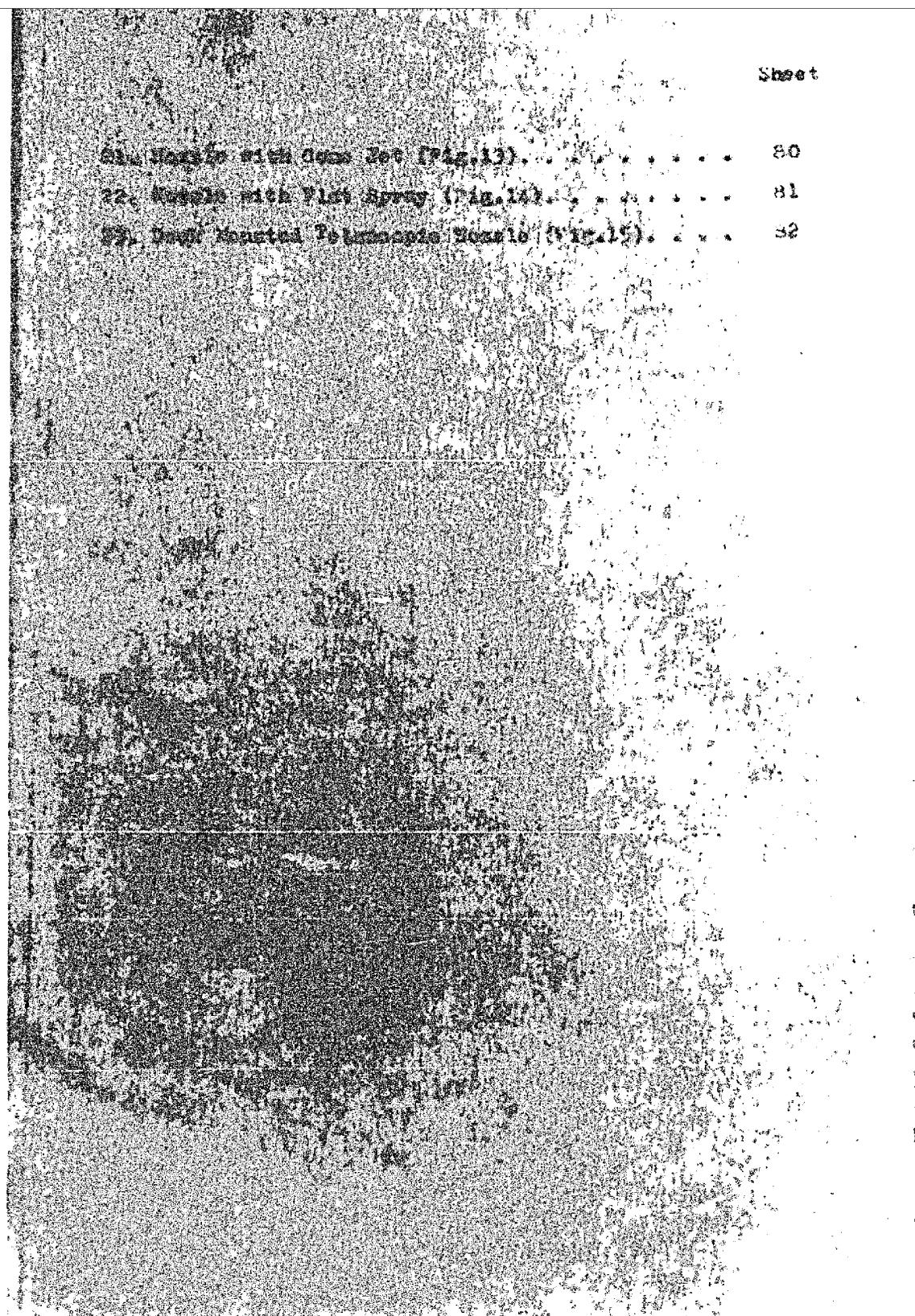
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WATER FIRE EXTINGUISHING SYSTEM

I. DESCRIPTION

A. Purpose

1. The water fire extinguishing system is designed to combat fire on board ship by a jet of sea water.

2. The system supplies water to the following consumers:

- fire hydrants;
- gun ammunition and A/S rocket magazine sprinkling system;
- A/S rocket magazine flooding system.

3. Besides fire extinguishing, the water extinguishing system is used for the following purposes:

- operation of water-jet pumps of the bilge and ballast systems;
- cooling the gun mounts;
- operation of the water protection system;
- feeding with water the sea water pipe line and its consumers (in emergency cases);
- pumping through the oil coolers of the gas-turbine installations and side rudders;
- washing the side rudder recesses;
- pumping through the A/S rocket magazine flooding Kingston valves;
- feeding with water the air cooling system as well as cooling the air in the sensor compartment and radar converter room;
- emergency cooling of the main diesel engine and diesel-generators;

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- pumping through the log, washing the anchor chain and deck and supplying sea water to other consumers.

B. System Components

The water fire extinguishing system incorporates the following items:

- pumps,
- sea chests,
- fire pump suction and delivery pipe lines,
- fire main,
- fire hydrants,
- measuring instruments,
- fire discharge hoses,
- fittings.

C. Pumps

5. The water fire extinguishing system is served by four HUE - 63/80 electric fire pumps supplying water to the consumers and maintaining the pressure in the fire main.

The pumps are single-stage vertical centrifugal pumps.

Each pump has a 63 m³/hr. capacity at 80 m H.G. full pressure.

All the pumps are provided with shock absorbers.

6. The numbers of the fire pumps and their location are given in the table below:

No. of fire pump	Location
Fire pump No.1	Fore engine room, at bulkhead, 56 fr. C.L.
Fire pump No.2	Stabilizer room, at bulkhead, 81 fr. C.L.

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Fire pump No.3	Aft engine room, at bulkhead, 96 fr. starboard.
Fire pump No.4	Aft engine room, at bulkhead, 96 fr. port

7. The fire pumps are controlled locally from the place of installation, and remotely from the maneuvering room (fire pumps Nos.2,3,4) and secondary control station (fire pump No.1).

8. Along with the fire pumps a portable pump is installed. A motorpump can be used to combat fires, and this has a capacity of 800 l/min. at 60 m.e.G. full pressure and a suction lift of 1.5 m.

The motorpump is installed on the deck in way of No.68 gun, starboard at the forward wall of the funnel.

The suction hoses are stored in the steering gear compartment and discharge hoses, in the boatswain's store room located in the funnel space.

D. Sea Chests

(Diagram No.1)

9. The fire pumps take suction through the sea chests.

The sea chests are used to prevent penetration of air into the fire pump suction pipes and to provide steady operation of pumps both when the ship is running ahead and astern.

10. Welding pads with sink protectors fitted to the upper wall of the sea chest are used for connection of suction kingston valves (36,26,23,24) of the fire pumps and ventilation kingston valves (35,28,25) through which air is extracted from

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the sea chests (see diagram No.2).

The sink protectors are used for protection against corrosion of the steel structure of the sea chest and ship's shell plating around the sea chest.

11. A circular pipe with openings through which air or steam compressed to 5 kgf/cm^2 is supplied to the suction strainer is mounted above the strainer. It is used to blow through a clogged suction strainer and protect it from freezing-up in cold weather when the ambient temperature is below zero.

Air and steam are supplied to the circular pipe through the non-return valve. Along with heating of the suction strainer provision is made for supplying steam directly to the sea chest through the check valve in order to avoid ice formation.

12. A partition inside the sea chest divides it into two sections one of which houses a suction strainer and the other is arranged for suction by the fire pump.

Due to the partition the water entering the suction strainer rises up to the upper part of the sea chest, then changes its direction and flows down to the water suction pipe of the sea chest. A change in direction of water flow and the low speed of the water in the sea chest facilitate separation of air bubbles which accumulate in the upper portion of the sea chest and escape through a vent Kingston valve and a pipe. To protect the compartments from flooding, the vent pipe is brought to the underside of the ship's upper deck.

13. The suction strainer and partition are made removable in order to make possible cleaning and painting of the sea chest from inside at dockyard.

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The suction and vent kingston valves are connected to the sea chest welded pads by means of canvas gaskets and red lead.

14. For the arrangement of sea chests, see Diagram No.2.

2. Fire Extinguishing System Pipe Line

15. The pipe line of the fire extinguishing system is completely made of copper-nickel pipes.

For the diameter and thickness of pipes, see diagram No.2.

16. The pipes are connected by means of welded brass rings with loose flanges. The gaskets for flanges are made of paronite.

17. In order to eliminate sweating, the pipes of the fire extinguishing system located in living spaces and stations as well as those passing above the electric devices in the engine rooms, are insulated and covered with canvas.

18. To avoid sagging and vibration, the pipes are rigidly secured to the ship's framing by means of clips. The clips are made tight with rubber gaskets.

19. All nuts of the threaded connections are provided with shake-proof washers preventing the nuts from getting loose.

20. The water fire extinguishing system pipe line is equipped with interflange steel protectors which prevent pipe line corrosion.

3. Fire Pump Suction and Delivery Pipe Line

(Diagrams Nos.1 and 2)

21. The fire pumps take suction from the sea chests via suction kingston valves (23,24,26,36) and suction pipe lines. The suction kingston valves are controlled locally.

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22. The fire pumps discharge water to the fire main through the delivery lines equipped with zero discharge valves (19,21,27,37), after then check valves (3,14,18,20) are installed.

23. The zero discharge valves are used to protect the fire pumps in operation from overheating if there is no consumption of water from the fire extinguishing system. Protection is effected by partial discharge of water overboard through the outlet pipes.

24. Check valves (3,14,18,20) fitted on the pump delivery side are used to disconnect the fire pumps from the fire main and are controlled locally.

The check valves are provided with label plates and luminous marks. The label plates installed near the valves on the delivery pipes indicate the valve number and position (open-closed) for combat duty, the luminous marks help to control the valves in darkness (see Fig.1).

Check valves (3,14,18,20) of the fire pumps are open for combat duty.

25. The suction and delivery pipe lines are connected to the fire pumps by means of reinforced hoses which are used to damp the vibration of the fire pumps and to reduce noise (see diagram No.1).

3. Fire Main

(Diagrams Nos.2 and 3)

26. The fire main is made in the form of a cross connected port and starboard line running between 22-26 frames under the main deck and in fore and after parts of the ship it is in the

form of single pipe extensions.

27. In order to ensure reliable operation of the system, if some parts are damaged, the fire main is equipped with cross connections which provide simultaneous or separate operation of the fire pumps to different consumers situated at various points of the ship.

28. Isolating valves (1,2,4,5,6,7,8,9,10,12,16) fitted to the fire main disconnect the separate parts of the fire main in case of damage. By closing valve (7) the fire main is divided into two individual sections. The starboard individual section is served by fire pumps Nos.1 and 2 and the portside individual section is served by fire pumps Nos.3 and 4.

Both in every day service and in combat condition the same isolating valves (2,4,5,7,8,9,10,16) are open and valves (1,6,12) are kept closed.

29. Each isolating valve fitted to the fire main has a number. The number of the valve and its position for combat duty (open/closed) are inscribed in the label plate installed on the pipe near the valve (see Fig.1).

Valves (1,4,5,6,7,8,9,10,12,16) are controlled locally by means of handwheels as well as remotely from the upper deck by means of shaft extensions.

To operate the isolating valves in darkness, luminous marks are installed on pipes near each valve (see Fig.1).

30. To operate the isolating valves by means of handwheels from the rooms, the locking plates are removed from the shaft extension deck sockets.

The isolating valves are controlled from the upper deck with the help of deck socket wrenches.

11. The fire hydrants situated on the upper deck and in the rooms are connected to the fire main by means of fire discharge pipes.

The number and location of fire hydrants are given in the following table:

Exposure No.	Description	Qty
1	Upper deck, 15-16 frs. 5th	1
2	Lower space No. 1, 15-16 frs. at 5th	1
3	Passage, 11-12 frs. 1st	1
4	Officers' Passage, 15-16 frs. Port	1
5	Upper deck, 18-19 frs. Port	1
6	Engine room passage, 15-16 frs. 5th	1
7	Upper deck, 18-19 frs. Port and star	2
8	Upper deck, 18-19 frs. Port and star	2
9	Two engine room, on delivery pipe and fire pump room	1
10	Two engine room, on delivery pipe and fire pump room	1
11	Upper deck, 18-19 frs. 5th	1
12	Engine room, on delivery pipe and fire pump room	1
13	Two engine room, on delivery pipe and fire pump room	1
14	Upper deck, 18-19 frs. 5th	1

Fire hydrants (3, 9), ref. dia. 70, are provided for supplying water from shore or from another ship as well as for delivering water to another ship. The rest of the fire hydrants are of ref. dia. 50.

B. Measuring Instruments

32. A type M22 100 psi pressure gauge and a type MTK 100 X/60 vacuum pressure gauge connected to the fire pump delivery and suction line respectively are provided to control the operation of the pump. The boards with pressure and vacuum pressure gauges to the fire pump are installed in the following places:

- a. To fire pump No. 1 - Log trunk side, 37 fr. C.A.
- b. To fire pump No. 2 - Bulkhead, 31 fr. Stbd.
- c. To fire pump No. 3 - Bulkhead, 30 fr. Port.
- d. To fire pump No. 4 - Bulkhead, 35 fr. Port.

An inscription indicating the number of the pump is engraved on the board. In addition, the "Delivery" and "Suction" are engraved above the pressure gauges and vacuum pressure gauges respectively.

33. To control the pressure head in the fire main, three pressure gauges joined to the fire main by hose connections are located on the fitting board in the maneuvering room, two pressure gauges are installed in the secondary control station and 1) to indicate the pressure in both individual sections of the main,

I. Fire Discharge Hoses

(Diagram No.3)

34. Fire discharge hoses with all-purpose nozzles on one end and couplings "PC" on the opposite end are provided for fighting fire aboard ship.

35. The fire discharge hoses intended for connection to the fire hydrants in the closed spaces are 10 m long and are stored in baskets near the hydrants.

36. The fire discharge hoses intended for connection to the fire hydrants on the upper deck are 20 m long and are arranged over the ship as follows:

three - for hydrants (1,4 and 6) in the fire-fighting equipment store room located in the port side breakwater;

two - for hydrants (11,15) in the air inlet trunk recess, 55-60 fms, stbd;

two - for hydrants (10,12) in the air inlet trunk recess, 55-60 fms, port;

one - for hydrants (19,21) in crew's space No.4 companion recess, 105-108 fms;

one - for hydrants (8,9) (delivery of water from shore or another ship) - in the superstructure recess, stbd.

37. The hose used to deliver water from shore is provided on both ends with couplings "PC", ref. dia. 70/50.

An adapter with couplings "PC" and "POT", ref. dia. 70/50 is provided aboard ship for connection to a shore water hose in case the shore hydrants are also fitted with coupling "POT".

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J. Fittings

18. The fittings of the fire extinguishing system are standardized and are made of brass; the system is also provided with special fittings. The list of fittings used in the fire extinguishing system is given in supplement I. The special fittings are described in the following sections.

(a) Zero discharge valve

Ref. dia. 50

(Fig. 2)

The purpose of the zero discharge valve is to prevent the pump from overheating by partially discharging water if there is no water consumption at all.

The principal parts of the zero discharge valve are: housing (1), bonnet (2), disc (4) and sleeve (5). The disc travels in the housing and bonnet (2), the latter contains spring (3).

The valve operates as follows:

When the pump, water is admitted into the valve lower inlet immediately and forces the valve disc up thus opening the valve and providing passage of water into the main. If the consumption of water from the main is stopped, the pressure in the valve housing is levelled and disc (4) under the action of the compressed spring comes to its seat.

As the disc approaches the valve seat, the holes in bush (3) are designed to reduce hydraulic impacts and allow part of water to discharge through the circular crevice in the push rod of disc (4) and bush (3) into the bush holes, from which

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the water is made to flow into pipe connection (8) and is removed overboard through a pipe.

(b) Fire hydrants, ref. dia. 50

(Fig. 3)

The fire hydrants are provided for connection of fire hoses through which water is supplied to the fire area or for washing the deck.

A fire hydrant consists of:

valve (7) with elongated cover screwed into welded pad (1) on the main deck,

pipe (11) with drain valve (5),

two-way welded pad (2),

fire branch water pipe (14) with coupling "PC" (15) and screw cap (1).

The valve handwheel is led to the main deck and is provided with a label plate bearing the inscription "Fire hydrant".

(c) All-purpose nozzle

(Fig. 4)

The all-purpose nozzle is intended to supply water in the form of a spray or jet to the fire area.

The nozzle consists of housing (5), control box (1), spooling (3), screw cap (17), spout (9), valve (6) and nozzle (3). The valve is connected to the nozzle by means of axle (2).

Screw handle (1) is turned to the right or to the left, valve (6) travels in the axial direction and changing the passage regulates the intensity of water jet at the spout. The

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valve is closed by rotating the handle to the right or to the left up to the limit.

To create a water screen or spray of water it is necessary to turn check ring (7) (which in case of a jet should be closed) counterclockwise.

Water forced into the nozzle from the fire main gets onto the holes arranged over the circumference of the atomizer housing, is broken up and after passing the slots in the atomizer is transformed into a water mist.

The angle of spray is regulated by turning check ring (7).

The all-purpose nozzle is connected to the fire hose by means of a coupling "PC" (4), ref. dia. 50.

(d) Drain valve, ref. dia. 5

(Fig. 5)

The drain valve is designed to remove water from the hydrant fire branch water pipe during long-term idling, preservation of the pipe line and in cold weather.

The valve comprises housing (1) pipe branch (2) for connection of a flexible hose, spindle (3) and two joint pins (4, 5).

(e) Shaft extension deck socket

(Fig. 6)

The deck socket is intended to control (by means of the shaft extension) the operation of the valves of the fire extinguishing, springling and flooding systems.

The socket consists of bush (1) with shaft (6) which rests by its shoulder against pipe connection (4). The lower end of the pipe connection comprises gland (5). Shaft (6) is capable

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of only rotary motion. Forward motion of the valve spindle is effected due to the shaft extension coupling. Travel indicator (7) can be made to reciprocate over the shaft thread and as the indicator edge comes out of the bush, the valve is assumed to be opened.

Lock cover (2) should be closed when the valve is closed and the indicator comes inside the bush.

Thus, open or locked closed cover (2) indicates that the valve is not closed. Gasket (3) is used to protect shaft (6) from spontaneous rotation. Each deck socket is provided with a label plate indicating the purpose of the socket.

II. SERVICE INSTRUCTIONS

A. Starting Fire Pump in Service and Stopping

39. To start the fire pump in operation, proceed as follows:

- (a) Open the inlet valve of the fire pump to be started.
- (b) Open the venting valve of the sea chest.

40. Before starting and start the fire pump in accordance with the instructions for maintenance of the pump.

- (a) Open the check valve fitted on the discharge pipe line of the pump.

41. To stop the fire pump, proceed as follows:

- (a) Close the check valve fitted on the discharge pipe line of the pump to be stopped.

42. Stop the pump in accordance with the instructions for maintenance of the pump.

(c) Close the suction kingston valve of the fire pump.

NOTE: Close the suction kingston valve and check valve fitted on the discharge pipe when the pump is to be shut down for a long period of time with power supplied from shore and provided the pump being stopped is not the service pump. In all other cases do not close the suction kingston valve and check valve, this being a precaution taken to ensure remote starting of the pump.

B. Fire Pump Operational duty

41. To keep the water fire system under pressure, maintain the following operational duty of the fire pumps:

(a) With the ship at berth in all states of readiness, any one pump is in operation for the entire rain.

Keep the remaining pumps always ready for immediate use (the suction kingston valves and check valves fitted on the discharge pipes of the pumps are kept open).

NOTE: When the fire system is supplied from shore, keep the service fire pumps ready for immediate use. The suction kingston valves and check valves on the discharge pipes of the service tanks should be open. The rest of the pumps should be out of operation according to item 40.

(b) With the ship at berth, when an alarm (battle, gas, damage) is sounded, when weighing anchor or mooring, shipping and unshipping of ammunition all the four pumps are brought in operation.

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(a) With the ship under way in narrow, in an area of brush
 ice, in conditions of poor visibility and when an alarm
 is sounded, all the four pumps are brought in operation.

(b) With the ship under way in other cases not mentioned
 in item "a", only one fire pump is in operation.

Keep the rest of the fire pumps in a state of readiness.
 Suction hinged valves and check valves on the de-
 delivery pipes are open).

C. Maintenance of Fire Extinguishing System

Check the pressure at the fire pumps and in the fire
 measuring instruments.

Periodically blow through the suction strainers of the
 fire pumps with compressed air.

44. In cold weather with ambient temperature below zero
 proceed as follows:

(a) periodically test the suction strainers and sea chests
 and prevent them from freezing;

(b) drain the fire systems situated on the main deck
 through the drain valves.

45. IN CASE OF START OF FIRE BRING ALL THE
 FIRE PUMPS IN OPERATION

46. In case of fire using the water fire extinguishing system,

1. Call for discharge nozzle;

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(b) connect the hoses to the fire hydrants;

(c) open the fire hydrants.

46. When putting the motorpump in operation, follow the instructions for maintenance of the motorpump.

47. After using the hoses, dry them and put in the prescribed places.

3. Changing-over of Fire Extinguishing System

Valves in Case of Damage

(Diagram No. 1)

48. In case of damage to some sections of the fire extinguishing system, disconnect the damaged sections of the system by closing the open isolating valves.

49. A few cases of damage to the fire extinguishing system are listed in the table below, which also shows the positions to be assumed by the valves.

Item No.	Damage sustained by	Close valves	Open valves
1	Fire pump No. 1	3, 36	-
2	Fire pump No. 2	14, 26	-
3	Fire pump No. 3	20, 24	-
4	Fire pump No. 4	13, 23	-
5	Forward fire main, 22-73 ft.	2	-
6	Forward crosspiece, 22 ft.	4	-
7	Forward main, 22-73 ft.	4, 8	-
8	Starboard main, 22-73 ft.	5, 10, 7	6, 12
9	Crosspiece in fore engine room	3, 5	-
10	Crosspiece in stabilizer room	10, 14	-
11	Crosspiece in aft engine room	9, 16, 20	-
12	Starboard main, 81-126 ft.	7, 9	-
13	Starboard main, 73-126 ft.	8, 16, 18, 23	-

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2. Simultaneous Operation of Fire Extinguishing

System Consumers

50. It will be noted that simultaneous operation of several consumers from the fire extinguishing system requires that the total consumption by loads running at the same time correspond to the capacity of the operating pumps.

51. The table given below shows amounts of water consumed from the fire extinguishing system by principal loads and also a few examples of supplying water to several consumers simultaneously depending on the number of pumps in operation. The number of consumers operated at the same time should be read off accordingly.

No. fire pumps in operation	G	Total capacity, gpm	Magazine spraying										
			Stationary magazine ejector, pos.	Portable drainage ejector, pos.	Aft rocket magazine flooding ejector, pos.	Seeding of gun rounds barrel, pos.	Forward ammunition room	Aft ammunition room, port	Aft ammunition room, starboard	Forward 1/8 rocket magazine	Aft 1/8 rocket magazine	Water protection system	
1	10	10	1	1	1	1	1	1	1	1	1	1	
2	20	20	1	1	1	1	1	1	1	1	1	1	
3	30	30	1	1	1	1	1	1	1	1	1	1	
4	40	40	1	1	1	1	1	1	1	1	1	1	
5	50	50	1	1	1	1	1	1	1	1	1	1	
6	60	60	1	1	1	1	1	1	1	1	1	1	
7	70	70	1	1	1	1	1	1	1	1	1	1	
8	80	80	1	1	1	1	1	1	1	1	1	1	
9	90	90	1	1	1	1	1	1	1	1	1	1	
10	100	100	1	1	1	1	1	1	1	1	1	1	

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1	2	3	4	5	6	7	8	9	10	11	12	13
Four fire pumps in operation	252	-	-	-	-	-	-	-	-	-	-	1
		3	1	2	-	4	-	-	-	-	-	-
		2	1	1	-	1	1	1	1	1	1	-
		1	1	-	2	-	-	-	-	1	1	-

52. The operation of the water protection system requires full capacity of all the four fire pumps. To operate the system, open isolating valves (5,12). When operating the water protection system, the pump pressure should not be less than

If connection of an additional consumer is absolutely necessary during operation of the water protection system, follow the order of the commanding officer, evaluate the situation and cut out the least important section of the water protection system.

Elimination of Leaks and Methods of Their Elimination

1. Leaking coupling bolts.

Tighten nut of coupling bolts.
If leak is not eliminated, replace gasket. Replace coupling bolts if necessary.

2. Leaking reinforced hose.

Replace hose.

3. Leaking thread connection.

Tighten coupling nut. If leak is not eliminated, replace gasket.

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56. Leaking fittings
glands

Tighten glands; if leak is not eliminated, replace gland at first opportunity.

57. Leaks through flanges
and cracks of pipes

Put temporary bandage. Weld or replace damaged parts of pipes at first opportunity.

58. Excessive pipe vibra-
tion

Check fastening of pipes to
links and welding of links to
ship's hull. Eliminate defects.

C. Preventive Inspections and Repairs

Keep the water fire extinguishing system in a state of readiness. Follow the requirements of the instructions for maintenance of the pumps and also carry out preventive repairs effectively and in due time:

Inspection No. 1 - daily

59. Check the pipe lines, fittings, measuring instruments and shaft extensions from dust and dirt, make sure that all fittings, instruments and shaft extensions are in good working order. Inspect them for leaks and that all friction parts of the fittings and shaft extensions are greased properly.

60. Check to see that all the shaft extension wrenches are in position.

61. Check the fittings to ascertain that the main is connected properly.

62. Check the measuring instruments for scale.

Inspection No. 2 - weekly

Check all items in Inspection No. 1 and also the following:

63. Lubricate and work back and forth the fittings and shaft extensions.

64. Clean the shaft extension deck sockets and fill them with lubricant.

Inspection No. 3 Monthly

Check all items in Inspection No. 2 and also the following:

65. Check the gland packings for proper functioning, replace them or repack if necessary.

Inspection No. 4

(Once in three months)

Check all items in Inspection No. 3 and also the following:

66. Inspect and check the fire discharge hose in operation.

67. Wash, lubricate and work back and forth the drain valves.

68. Check the fire pump pressure gauges using a reference measuring instrument.

Inspection No. 5 - every 6 months

Check all items in Inspection No. 4 and also the following:

69. Check the valves for tightness by working pressure.

70. Inspect the pipe lines for insulation and marking and rectify it if necessary.

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71. Check, lubricate and work back and forth the drain plug fitted on the pipe line.

Inspection No. 6 - Yearly

Check all items in Inspection No. 5 and also the following:

61. Replace the steel interflange protectors on the pipe line. The surfaces of the protector and flange connection ring should be secured in order to provide reliable electrical contact between the protector and the flange connection ring.

The protectors worn out to more than 50% of the initial size should be subjected to subsequent replacement before expiration of one year, for example, in 9-10 months.

The date of replacement must be entered in the logbook to be used later for specifying protector service life and dates of subsequent replacements on board ship.

After installation of protectors the pipe line should be tested for leaks in places where the protectors are fitted.

Inspection No. 7 - At docking

Inspect and make sure that the underwater fittings are tight and reliable. If necessary disassemble the fittings, clean, lubricate, repair and replace the zinc protectors, then assemble and test the fittings for tightness.

Inspection No. 8 - Ship's Running Repair

Check items in Inspection No. 5 and also the following:

81. Test the pipe lines for working pressure before and after repair, thoroughly inspect all connections and fittings.

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75. Remove, disassemble, repair and adjust all the defective fittings. Test the fittings for tightness after repair.

76. Inspect for proper condition, test in operation all the shaft extensions of the fittings and eliminate the defects detected.

77. Inspect the pipe lines for corrosion, clean and paint with prescribed paint the places subjected to corrosion and replace the defective parts of the pipe line.

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GUN AMMUNITION AND A/S ROCKET MAGAZINE SPRINKLING SYSTEM

I. DESCRIPTION

A. Purpose and System Components

1. The sprinkling system is intended for cooling ammunition in the magazines and paints in the capstan room; for reducing temperature, in the magazines in the event of fire in the compartments adjacent to the magazine and capstan room; also the system is used to combat fire in the magazines and capstan room.

The sprinkling system comprises a pipe line with the following

B. System Design

(Diagram No.4)

2. The sprinkling system serves A/S rocket magazines Nos. 1 and 2, ammunition rooms Nos.1,2,3, underturret spaces Nos. 1 and 2 and the capstan room.

Pipes with drenchers (4)) are fitted in the ammunition room and capstan rooms and A/S rocket magazines for the purpose of sprinkling.

The underturret spaces are sprayed through perforated pipes having holes, 2.5 mm in diameter, with 127 mm pitch.

3. The sprinkling system of ammunition room No.1 is controlled in by valve (54), valve (52) controlled from the main deck, through bush (55) of the shaft extension and also from crew's space No.1 by valve (52) with the help of a quick-disconnect

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coupling.

4. The sprinkling system of A/S rocket magazine No.1 is cut in from the magazine by valve (55) and also by valve (56) controlled from the main deck through bush (57) of the shaft extension.

5. The sprinkling system of ammunition room Nos. 1 and 2 is cut in from the magazines by valves (46,64) respectively, valves (49,51) arranged in the aft engine room and controlled from the main deck through bushes (48,50) of the shaft extension, as well as from the aft engine room by valves (47,59) with the help of quick-disconnect couplings.

6. The sprinkling system of A/S rocket magazine No. 2 is cut in from the magazine by valve (44) and valve (45) arranged in the steering gear compartment and controlled from the main deck through bush (41) of the shaft extension.

7. The sprinkling system of the underturret spaces of gun mounts Nos.1 and 2 is cut in by valves (43,46), respectively, from the underturret spaces.

8. The sprinkling system of the capstan room is cut in by valve (61) arranged in crew's space No.1 compartment, controlled from the main deck through bush (62) of the shaft extension.

9. Cooling of gun mounts Nos.1 and 2 barrels is switched on by valves (51,47), respectively, from the underturret spaces.

10. The sprinkling system valves are controlled from the upper deck by means of deck socket wrenches. For the arrangement of socket wrenches, see diagram No.6. The shaft extension deck openings are sealed.

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11. In order to control valves (44,45,46,50,54,55,60) in darkness luminous marks are fitted on pipes near valves (See Fig.1) The valves are sealed.

C. System Pipe Line

12. The sprinkling system pipe line is made of copper-nickel pipes.

13. The pipes are connected by brass welded rings with steel loose flanges and by means of bronze pipe connections. The gaskets for flange and pipe connections are made of paronite.

14. In order to avoid sagging and vibration, the pipes are rigidly secured to the ship's framing by means of clips. The clips are made tight with rubber gaskets.

D. Fittings

15. The sprinkling system is equipped with standardized bronze fittings as well as with special equipment.

The list of fittings used in the system is given in Supplement No.1. The description of the special equipment is given below.

Drencher with Rose (Fig.7)

The drencher is intended to spray water supplied from the fire main for sprinkling the gun mount ammunition magazines and consists of pipe connection (4), diaphragm (3), clip (1) and rose (2). The drencher is connected to the pipe by means of welded pad (5).

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II. SERVICE INSTRUCTIONS

A. Maintenance of Sprinkling System

16. In case of an abrupt rise of temperature in the magazine, underturret space or in the capstan room due to fire in the adjacent compartment and also in case of fire in the magazine or capstan room immediately bring the sprinkling system in operation by opening the corresponding valve.

The sprinkling valves are controlled as shown below.

Compartment to be sprinkled	Control from magazines	Control from ad- jacent compart- ment		Control from upper deck		
	No. of valve to be opened	No. of valve to be open- ed with the help of quick disconn- ect coupling	Location of quick disconn- ect coupling	No. of deck socket	No. of valve to be opened	Location of deck socket
Magazine room No. 1	54	52	Crew's space No. 1	53	52	Deck frs., stbd.
Underturret space No. 1	50	-	-	-	-	-
Aft rocket magazine No. 1	55	-	-	57	56	Deck frs., stbd.
Magazine room No. 2	46	49	Aft engine room	46	49	Deck frs., port
Magazine room No. 3	58	59	Aft engine room	58	59	Deck frs., stbd.

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1	2	3	4	5	6	7
Underturret space No.2	45	-	-	-	-	-
A/S rocket magazine No.2	44	-	-	41	42	122- 122 fire., port
Captain room	-	-	-	62	61	10-11 fire., atbo

17. After the fire is extinguished close the sprinkling valve.

- SCES: 1. When flooding the A/S rocket magazine, the sprinkling system is in operation during the whole period of flooding.
Close the sprinkling valve of the A/S rocket magazine right after closing the flooding Kingston valve.
2. When sprinkling underturret spaces Nos.1 and 2, examination rooms Nos.2 and 3 and captain room, drain water following the operating instruction for the bilge system.

18. Keep closed valves (51),(47) supplying water for cooling the gun mounts and open them only when preparing the mounts for action.

B. Possible Problems and Methods of Their Elimination

19. Leaking flange connections. Tighten nuts of coupling bolts.
20. Leaking pipe connections. Tighten union nut.

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21. Crack on pipe.

Put bandage. Replace pipe at first opportunity.

22. Excessive pipe vibration.

Check to see that pipes are properly secured to clips and the clips are welded to ship's framing.

Eliminate faults detected.

C. Preventive Inspections and Repairs

23. To keep the sprinkling system in a state of constant readiness, preventive inspections and repairs should be accomplished effectively and in good time.

Inspection No. 1 - Daily

24. Clean the pipe lines, fittings and shaft extensions from dust and dirt inspect them to be ascertain that they are in good operating order, inspect them for leaks, check to see that the friction parts of the fittings and shaft extensions are properly greased.

25. Check to see that the shaft extension wrenches are in position, the seals are on bushes and quick-disconnect joints.

Inspection No. 2 - Weekly

Check all items in Inspection No. 1 and also the following:

26. Clean the shaft extension de sockets and lubricate them with grease.

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Inspection No. 3 - Monthly

Check all items in Inspection No. 2 and also the following:

27. Lubricate and work back and forth the fittings and shaft extensions.

It is recommended to perform the above operation with no ammunition in the magazines. In case ammunition is kept in the magazines, disconnect the section of the fire extinguishing system supplying water for sprinkling using the isolating valves.

28. Check the gland packings for good condition tighten them or replace if required.

Inspection No. 4 - Once in three months

Check all items in Inspection No. 3 and also the following:

29. Inspect and clean the drenches and pipe perforated holes.

Inspection No. 5 - Every six months

Check all items in Inspection No. 4 and also the following:

30. Test the valves for tightness by working pressure.

31. Inspect the insulation and marking of the pipe lines

and repair them if required.

32. Lubricate and work back and forth the drain plugs in the pipe lines.

Inspection No. 6 - Ship's Turning Repair

Check all items in Inspection No. 5 and also the following:

33. Test the pipe lines for working pressure before and

after repair. Thoroughly inspect all connections and fittings.

34. Repair if possible, repair and adjust the defective fittings. Test the fittings for tightness after repair.

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35. Inspect and test all the shaft extensions and fittings in operation find and eliminate defects.

36. Inspect the pipe lines, clean and paint with prescribed paint the places subjected to corrosion, replace the defective sections of the pipe lines.

Test the system for operation supplying water to the magazine empty of ammunition for a short period of time.

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A/S ROCKET MAGAZINE FLOODING SYSTEM

I. DESCRIPTION

A. Purpose

1. The system is intended to protect fire in the A/S rocket magazines by quickly flooding them with water.

B. System Components

2. The flooding system comprises:

- flooding inlet kingston valves;
- flooding ejectors;
- pipe line with fittings.

C. Inlet Kingston Valve

A standard inlet kingston valve is shown in Fig. 8. The inlet kingston valve is installed on pipe branch (1), secured to the pipe branch is suction strainer (2) and non-return valve used to pump through the suction strainer with water from the fire pump.

The pipe branch upper flange comprises protector (3) to protect the pipe branch and bottom from corrosion.

D. Flooding Ejector

(Fig. 9)

The RM 50/7 ejectors are used for flooding the magazines. The capacity of an ejector is 50 t/hr. and the working water consumption is 55 t/hr.

3. Water is drawn and discharged by the ejector on account of the energy of the working water flowing through nozzle (4)

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of the ejector.

A jet of working water flowing from nozzle (4) creates rarefaction in the chamber (ejection) and causes the ejector to draw water.

An ejector consists of body (1) which comprises a mixing chamber, diffuser and nozzle (4).

Nozzle (4) is provided with thread which together with bush (2) and nut (1) enables the nozzle to be installed at different distances relative to the diffuser. The nozzle is installed on the ejector and tested for maximum capacity by the manufacturer.

L. System Design

(Diagram No. 5)

4. Inlet Kingston valve (73) and flooding ejector (74) are located in a special recess in A/C rocket magazine No. 1, 2 and 3 frames.

5. Inlet Kingston valve (73) and flooding ejector (80) of A/C rocket magazine No. 2 are arranged in the steering gear compartment of the 1st frame.

6. To enable air to escape from the magazine when flooding and to drain it after draining the magazine after flooding, magazines No. 1 and 2 are equipped with air goosenecks with protective covers (75, 76).

7. Water (74) used to pump through the Kingston strainer in the steering gear compartment No. 1 is controlled from A/C rocket magazine No. 1.

8. Water (74) used to pump through the Kingston valve strainer in the steering gear compartment is controlled from the place

of installation. The pipe lines used to pump through the kingston valve strainers are connected to the kingston valves by means of man-return valves (67 and 68).

Flooding kingston valve (70) is opened from the upper deck by deck socket (66) and also from the passage on the lower deck by means of quick-disconnect coupling (69) of the shaft extension.

Valve (73) supplying working water from the fire main to flooding ejector (74) is controlled both from the upper deck by deck socket (71) and from the passage on the lower deck by means of shaft extension quick-disconnect coupling (72).

Flooding kingston valve (77) is opened from the upper deck by deck socket (76).

Valve (82) used to supply working water from the fire main to flooding ejector (83) is controlled from the upper deck by deck socket (81).

A. The deck sockets of magazine No.1 flooding system are arranged in the superstructure passage, 49-50 frames at C.L.

The deck sockets of magazine No.2 flooding system are arranged on the upper deck, 121-124 frames, starboard.

The valves supplying working water to the ejectors and flooding system kingston valves are controlled from the upper deck by means of socket wrenches. For the arrangement of socket wrenches, see diagram No.6.

B. System Pipe Line

The flooding system pipe line is made of copper-nickel

The pipes are connected by brass welded rings with loose

The gaskets for the flange connections are made of paronite.
The Kingston valve with pipe branch is made tight with cam-
bolts and gaskets on minims.

13. To avoid sagging of the pipes, the pipes are rigidly
secured to the wall's framework by clips. The clips are made
tight with rubber gaskets.

14. Flowmeter

14. The flowmeter system consists of two 1/2 inch bronze fitt-
ings and special...

For the first of...

The special...

Shaft Extension

(Fig. 1)

The quick-disconnect coupling of the shaft extension is
designed to open the fittings and to be able to operate it
is not possible to operate the shaft extension only by a special tool.
The quick-disconnect coupling consists of body (1), cotter
pin (2), lock ring (3) and shaft extension (4).
with body (1).

The assembled quick-disconnect coupling and tool (5).

Use the coupling in the following order:

1. Break the seal.
2. Take off the cotter pin from the body.
3. Rotate the shaft extension.

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FLOODING SYSTEM

A. Flooding System

15. In every day service periodically pump through the suction strainers of the main line flooding Kingston valves to prevent them from clogging.

16. In the event of fire in the system and in case of inadequacy of the sprinkling system or in operation the flooding system of the main line.

17. To flood the main line in case of fire:

- (a) open flooding system main line valve
- (b) open the valve to the main line from the ejector.

18. When flooding the main line with water up to the upper boat level, close the water main valve and at once close the flooding Kingston valve.

NOTE: Estimate time required for the main line to fill up to the upper boat level and for sprinkling and flooding system of the main line is about 20 minutes; for auxiliary system is about 10 minutes.

B. Possible Troubles and Their

Elimination

- | | |
|---------------------------------|----------------------------|
| 19. Leaking flange connections. | Tighten or replace flange. |
| 20. Leaking pipe connections. | Tighten or replace pipe. |
| 21. Cracks on pipes. | Cut out and replace pipe. |

22. Excessive pipe vibration.

Check securing of pipes to
links and welding of links
to ship's hull. Eliminate
troubles.

C. Preventive Inspections and Repairs

23. To keep the flooding system in a state of constant readiness, preventive inspections and repairs should be accomplished effectively and in good time.

Inspection No. 1 - Daily

24. Clean the pipe lines, fittings and shaft extensions from rust and dirt. Inspect them to be certain that they are in good operating order, check the pipes and pipe connections for leaks and friction parts of fittings and shaft extensions for proper lubrication.

25. Check to see that the wrenches for the shaft extensions are in position.

26. Check to see that the quick-disconnect couplings are provided with seals.

Inspection No. 2 - Weekly

Check all items in Inspection No. 1 and also the following:

27. Clean the shaft extension deck sockets and lubricate with grease.

Inspection No. 3 - Monthly

Check all items in Inspection No. 2 and also the following:

28. Check the gland packings for proper functioning, tighten or repack them if required.

Inspection No. 4 - Once in Three Months

Check all items in Inspection No. 3 and also the following:

29. Check and work back and forth the fittings and seals, shaft extensions, after that seal them again.

When working the fittings and shaft extensions back and forth, take measures to prevent flooding.

Inspection No. 5 - Every six Months

Check all items in Inspection No. 4 and also the following:

30. Check the valves for tightness by working pressure.

Inspection No. 6 - At docking

31. Inspect the underwater fittings for good operation and condition. If necessary, disassemble the fittings, find the defects, repair, replace the zinc protectors, reassemble the fittings and test them for tightness. Clean and paint the inlet pipe bristles and Kingston valve strainers of the flowing system.

Inspection No. 7 - Ship's Running Repair

Check all items in Inspection No. 5 and also the following:

32. Test the pipe lines for working pressure before and after repair, carefully inspect all connections and fittings.

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33. Remove, disassemble, repair and adjust the defective fittings. Test the fittings for tightness after repair.

34. Inspect and test in operation all shaft extensions of the fittings, eliminate the faults detected.

35. Inspect the pipe lines, clean the places subjected to corrosion, paint them with prescribed paint, replace the defective sections of the pipe lines. Test the system by short-time flooding of the magazine.

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WATER PROTECTION SYSTEM

1. DESCRIPTION

A. Purpose and System Components

1. The water protection system is intended to reduce the effect of high level radiation caused by an atomic explosion on the external ship surfaces, equipment and technical facilities.

2. Also the water protection system can be used to prevent fire spreading over the deck and superstructure.

3. The water protection system comprises a pipe line with fittings.

B. System Design

(Diagram No. 7)

4. Water to the water protection system is supplied from the fire main.

5. To ensure continuity of service of the water protection system, the latter is subdivided into five independent sections, each section being fitted with an individual connection to the water fire main.

6. Section No. 1. is controlled by valve (1) from crew's space No. 11. It is used for sprinkling the spaces in way of bow frame (main deck forward part, breakwater, superstructure forward walls). The main and distribution pipes are led under the main deck along the 1st tier superstructure forward wall.

7. Section No. 2 is controlled by valve (2) from the sea water control station. It is used for sprinkling spaces in way of 40-60 ft. (equipment on decks of the 1st and 2nd tier superstructures, main deck and walls of the 1st and 2nd tier superstructures).

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structures). The main and distribution pipes are led under the main deck along the side walls of the 1st and 2nd tier superstructures).

8. Section No. 3 is controlled by valve (3) from the starboard gun room. It is used for sprinkling spaces between 68-92 frames (equipment on the main deck, main deck and funnel casing). The main and distribution pipes are led under the main deck along the upper funnel casing.

9. Section No. 4 is controlled by valve (4) from the aft gun room local control station. It is used for sprinkling spaces between 90-130 frames (equipment on the main deck, main deck and companion-way walls). The main and distribution pipes are led under the main deck and along the companion-way.

10. Section No. 5 is controlled by valve (5) from the second gun room control station. It is used for sprinkling the navigating bridge deck, 2nd tier superstructure and mast equipment. The main and distribution pipes are led under the main deck and along the mast.

11. The sprinkling system of the gun mounts is controlled from the gun mounts position.

12. In order to operate valves 1,2,3,4,5 in darkness, luminous markers are provided on pipes near the valves (see Fig. 36.1).

13. The fire protection of the main deck, equipment on the main deck and superstructure decks is effected by spraying water through the starboard, circular and spraying nozzles.

14. The fire protection of the funnel casing and companion-way is effected through the sprinkling (perforated) pipes. The diameter of holes in the sprinkling pipes is 1.5 mm.

15. The diameter of holes is 125 mm for the forward walls and 167 mm for the side walls. The characteristics of the nozzles and

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sprinkling pipes and their location are described in the table below.

	Type of nozzle	angle of spray	Height of slit at nozzle or hole pitch, mm	Number of nozzles or long centers of sprinkling pipe	water consumption per nozzle at working pressure, l/min	Location
1	2	3	4	5	6	7
<u>Section No. 1</u>						
1	Spray nozzle	30°	1	1	1.2	Deck 11, 12-13 frs.
2	Slotted nozzle	110°	2	4	2.5	Deck 10, 11-12 frs. and 31-32 frs.
3	Slotted nozzle	175°	2	1	3.5	Breakwater, 1-17 frs.
4	Slotted nozzle	175°	2	1	1.5	Superstructure deck, 32-33 frs.
5	Circular nozzle	360°	2	1	12.1	Forward gun mount
6	Sprinkling pipes	-	125	6.2	1.08	Superstructure fore-hold wall, 36-37 frs.
7	Sprinkling pipes	-	167	6	0.91	Superstructure side walls
<u>Section No. 2</u>						
8	Nozzle with cone jet	60°	-	2	4.4	Superstructure deck, 4-12 frs.
9	Slotted nozzle	110	2	2	2.5	Deck 10, 11-12 frs.

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1	2	3	4	5	6	7
10	Sprinkling pipes	-	125	1	1.08	And tier superstructure forward wall, 17-18 frs.
11	Sprinkling pipes	-	167	3	0.81	1st and 2nd tier superstructure side walls
<u>Section No. 3</u>						
12	Slotted nozzle	110°	2	1	3.5	Main deck, 71-73 frs.
13	Slotted nozzle	100°	2	1	3.5	Main deck, funnel casing
14	Spray nozzle	75°	1	1	3.5	Main deck, funnel casing
15	Sprinkling pipes	-	125	7	1.06	Forward upper part of funnel casing
16	Sprinkling pipes	-	167	14	0.81	Side upper part of funnel casing
<u>Section No. 4</u>						
17	Slotted nozzle	110°	2	5	3.5	Main deck, 94-116 frs.
18	Nozzle with cone jet	60°	-	3	4.4	Main deck, 118-119 frs. and 122 fr.
19	Slotted nozzle	175°	2	1	5.0	Main deck, 90-91 frs.
20	Large conical slot nozzle	360°	2	1	7.3	Main deck, 110-112 frs.
21	Rotating nozzle	360°	2	1	12.1	1st gun mount

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	2	3	4	5	6	7
13	Sprinkling pipes	-	157	5	0.81	Upper part of companion way, 106-108 fire.
Section No. 5						
14	Nozzle with cone jet	60°	-	1	1.7	
15	Nozzle with cone jet	60°	-	1	1.7	2 x 2 x 2
16	Slotted nozzle	110°	2	2	2.	
17	Slotted nozzle	175°	2	2	2.	1 nozzle at aft end of list water supply structure

C. System Pipe Line

13. The water protection system pipe line is completely made of copper nickel pipes tightened by welded brass rings with loose flanges and by nipple connections.

The flange and pipe connections are made tight with mastic.

14. In order to avoid pipe sagging and vibration, the pipes are secured to the ship's framing with the help of brackets which are made tight with rubber gaskets.

15. Pipes passing through the living and service rooms are insulated and covered with canvas.

16. In places of possible accumulation of water the pipes of the water protection system are equipped with drain plugs.

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1. Nozzles

17. The water protection system is equipped with conventional bronze fittings and also with special accessories (nozzles).

The special accessories are described below.

(a) Circular Nozzle (Fig. 11)

The circular nozzle is intended to create a circular water film in the form of a disc. The thickness of the water film depends upon the slot height. The nozzle consists of body (1), cover (2) and nut (3).

(b) Slotted Sector Nozzle (Fig. 12)

The slotted sector nozzle is used to create a sector water film. The thickness of the water film depends on the height of slot and angle of spray (sector). The nozzle is a single unit.

(c) Nozzle with Cone Jet (Fig. 13)

The nozzle with a cone jet is used to create a jet in the form of a cone.

The nozzle consists of body (2) and screw-type insert piece (1).

(d) Nozzle with Flat Spray (Fig. 14)

The nozzle is intended to create a powerful water film. The thickness of the water film depends on the height of the slot. The nozzle is a single unit.

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5. Filtration

17. The water protection system is equipped with conventional bronze fittings and also with special accessories (nozzles).

The special accessories are described below.

(a) Circular Nozzle (Fig. 11)

The circular nozzle is intended to create a circular water film in the form of a disc. The thickness of the water film depends upon the slot height. The nozzle consists of body (1), cover (2) and nut (3).

(b) Slotted Sector Nozzle (Fig. 12)

The slotted sector nozzle is used to create a sector water film. The thickness of the water film depends on the height of slot and angle of spray (sector). The nozzle is a single unit.

(c) Nozzle with Cone Jet (Fig. 13)

The nozzle with a cone jet is used to create a jet in the form of a cone.

The nozzle consists of body (2) and screw-type insert piece (1).

(d) Nozzle with Flat Spray (Fig. 14)

The nozzle is intended to create a powerful water film. The thickness of the water film depends on the height of the slot. The nozzle is a single unit.

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(c) Deck Mounted Telescopic Nozzle (Fig. 15)

The nozzle is designed to create a jet in the form of a flat disc. The nozzle consists of body (1), sleeve (4), ring (5), rod (3), spring (2) with fastening parts and gasket (6). Changing the thickness of gasket it is possible to regulate the height of the nozzle slot.

II. SERVICE INSTRUCTIONS

A. Preparation of System for Use

18. Put all four fire electric pumps in operation.

B. Starting, Maintenance During Operation, Stopping

19. In case of imminent danger or actual contact with the fallout area open valves 1,2,3,4 and 5 on Commanding officer's order (Diagram No.7).

NOTE: To avoid water getting into the gas turbine air intake trunks, open valve 5 on the order of the Commanding officer only when the ship is propelled by the diesel engines.

20. Working of the ship must be continued until the ship leaves the fallout area.

21. When the water protection system is in operation, check the functioning of the fire pumps, and the pressure in the main using pressure gauges (see items 42,52 of the instructions for operation of water fire extinguishing system).

22. After leaving the contaminated area disconnect the system by closing valves 1,2,3,4,5 (Diagram No.7) on permission of the Commanding Officer.

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23. After stopping the system drain water from the pipe
lines through the hose valves and drain plugs.

24. If the system is out of operation, periodically open the
drain plugs, check the pipe lines for water and drain them.

C. Possible Troubles and Their Elimination

25. Leaking flange con-
nections.

Tighten nuts of coupling bolts.
If leak is not eliminated, re-
place gasket. If coupling bolts
are damaged, replace them.

26. Leaking pipe con-
nections.

Tighten union nut. If leak is
not eliminated, replace gasket.

27. Leaking fitting
packing glands.

Tighten glands. If leak is not
eliminated repack glands.

28. Cracks on pipes.

Put temporary bandage. Weld
damaged parts of pipes if pos-
sible.

29. Loose pipe
connections.

Check fastening of pipes to
bridges and welding of bridges
to ship's framing. Eliminate
defects.

30. Leaking in holes of
sprinkling pipes and
holes of spray nozzles.

Clean holes of sprinkling
pipes and slots of spray nozzles.

Inspection No. 1 - Daily

31. To keep the water pump in a state of constant readiness, preventive maintenance work should be accomplished effectively and in a timely manner.

Inspection No. 2 - Weekly

32. Clean the line lines, fittings and shaft extensions from rust and dirt, inspect them to make sure there are no leaks in fittings and that the shafts are parts of fittings and shaft extensions are properly greased.

33. Work the fittings back and forth.

Inspection No. 3 - Monthly

Check all items in inspection No. 1 and also the following:

34. Lubricate and work back and forth the fittings and shaft extensions.

Inspection No. 4 - Monthly

Check all items in inspection No. 2 and also the following:

35. Check the gland packing and tighten them or replace if necessary.

Inspection No. 5 - Once in three months

Check all items in inspection No. 3 and also the following:

36. Inspect and clean the spray nozzles and holes in the circulating pipes.

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Inspection No. 4 - Every six months

Check all items in inspection No. 4 and also the following:

37. Check the water protection system valves for tightness by working pressure.
38. Inspect the insulation and marking of the pipe lines, restore them if necessary.
39. Check, lubricate and work back and forth the drain plugs on the pipe lines.

Inspection No. 5 - Ship's Running Repair

Check all items in inspection No. 5 and also the following:

40. Test the water protection system in operation before and after repair, carefully check the connections and fittings for proper functioning.
41. Remove, disassemble, repair and adjust the defective fittings. After repair test the fittings for tightness.
42. Inspect and test in operation all shaft extensions and fittings, eliminate faults detected.
43. Inspect the pipe lines, clean and paint with preservative paint places subjected to corrosion, replace the defective sections of the pipe lines.

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LIST
OF FITTINGS USED IN SYSTEM

	Description	Drawing No.	Numbers of parts indicated in diagrams
1	2	3	4
Water Fire Extinguishing System (Diagrams Nos. 1, 2 and 3)			
1	Flanged-type straight-way check valve, ref. dia. 100	521-01.185	1, 3, 4, 5, 6, 7, 8, 10, 9, 12, 14, 15, 18, 20 (Diagram No. 2)
2	Flange-type straight-way check valve, ref. dia. 70	521-01.184	4, 8, 9 (Diagram No. 2)
3	End-type straight-way valve, ref. dia. 50	521-01.002	1, 3, 7, 13, 14, 15, 17 (Diagram No. 3)
4	Flange-type straight-way check valve, ref. dia. 50	521-36.001	2, 4, 6, 10, 11, 12, 15, 19, 21 (Diagram No. 3)
5	Kingston valve, ref. dia. 100	527-03.003	23, 24, 26, 36 (Diagram No. 2)
6	Kingston valve, ref. dia. 50	527-03.001	25, 26, 35 (Diagram No. 2)
7	Zero discharge valve, ref. dia. 80	586-3M5	20, 21, 27, 37 (Diagram No. 2)
8	Reinforced hose PA 100-16; L=500	949-76.60198	(Diagram No. 1)
9	Deck socket shaft extension dia. 21	573-03.132	22, 29, 30, 31, 32, 33, 34, 36, 39, 40 (Diagram No. 2)

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2	3	4
<u>Sprinkling System</u> (Diagram No. 5)		
Flange-type straight way, check valve, ref. dia. 50	51-01.183	61,44,47.1, 61,44,47.1
Flange-type straight way check valve ref. dia. 50	501-01.181	53,00
Straight-way union check valve, ref. dia. 30	501-01.181	40,40,40
Drencher with rose	51-01.17	43

<u>Flooding System</u> (Diagram No. 5)		
Flange-type straight way check valve, ref. dia. 70	501-01.184	73,80
Straight-way check valve, ref. dia. 10	521-3M617	66,81
Extension valve, ref. dia. 100	527-03.003	71,77
Drencher 3M 50/7	426-pyg	74,80
Extension valve, ref. dia. 100	573-03.126	71,93
Extension valve, ref. dia. 100	573-03.127	63,76

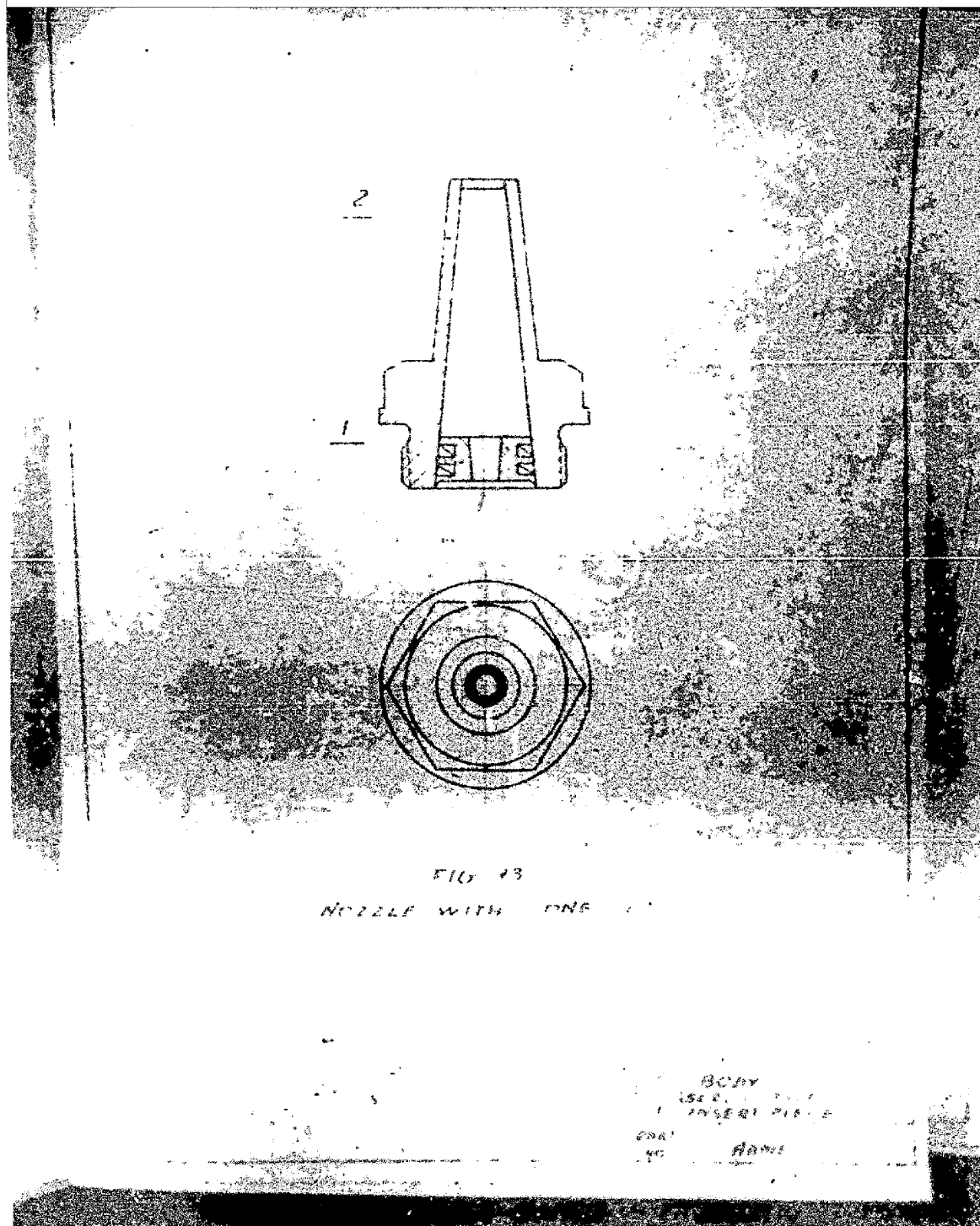
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Water Protection System
(Classification)

Flange-type straight-way valve, ref. dia. 7	501-111	1.1
Flange-type, straight-way valve, ref. dia. 50	501-111	1.1
Flange-type straight-way valve, ref. dia. 40	501-111	1.1
Slotted sector nozzle, $Q=2.5 \text{ m}^3/\text{hr.}$ $\alpha=110^\circ$	502-111	1.1
Slotted sector nozzle, $Q=3.0 \text{ m}^3/\text{hr.}$ $\alpha=110^\circ$	502-111	1.1
Slotted sector nozzle, $Q=3.0 \text{ m}^3/\text{hr.}$ $\alpha=135^\circ$	502-111	1.1
Slotted sector nozzle, $Q=3.0 \text{ m}^3/\text{hr.}$ $\alpha=175^\circ$	502-111	1.1
Slotted sector nozzle, $Q=3.5 \text{ m}^3/\text{hr.}$ $\alpha=110^\circ$	502-111	1.1
Slotted sector nozzle, $Q=3.5 \text{ m}^3/\text{hr.}$ $\alpha=175^\circ$	502-111	1.1
Slotted sector nozzle, $Q=5.0 \text{ m}^3/\text{hr.}$ $\alpha=150^\circ$	502-111	1.1
Slotted sector nozzle, $Q=5.0 \text{ m}^3/\text{hr.}$ $\alpha=175^\circ$	502-111	1.1
Back mounted telescopic nozzle, $Q=7.3 \text{ m}^3/\text{hr.}$ $\alpha=160^\circ$	504-111	1.1
Nozzle with cone jet, $Q=1.7 \text{ m}^3/\text{hr.}$ $\alpha=60^\circ$	500-111	1.1

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2		
Nozzle with con. jet. $Q=2.7 \text{ m}^3/\text{hr.}, \alpha = 30^\circ$	582-30.116	
Nozzle with con. jet. $Q=4.4 \text{ m}^3/\text{hr.}, \alpha = 60^\circ$	582-30.116	
Nozzle with flat jet, $Q=10.1 \text{ m}^3/\text{hr.}, \alpha = 75^\circ$	582-30.116	
Nozzle with flat jet, $Q=5.2 \text{ m}^3/\text{hr.}, \alpha = 70^\circ$	582-30.116	
Circular nozzle $Q=12.1 \text{ m}^3/\text{hr.}, \alpha = 360^\circ$	582-30.116	



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